REMARKS

The application was filed with claims 1-16. Claims 1-9 and 12 were canceled by previous amendments. Claims 17-29 and 30-36 were added by previous amendments. Therefore, claims 10-11 and 13-36 are pending. However, claims 11, 17-24, and 34-36 are withdrawn as being drawn to a non-elected invention. Thus, claims 10, 13-16, and 25-33 are currently under consideration. No claims are canceled or added herein. Claims 10-11, 13-16, 24-29, and 36 have been amended herein.

Request for Examiner Interview

Should the Examiner disagree that Applicant's amendments, arguments, and submissions place the pending claims in condition for allowance, Applicant respectfully requests an opportunity for Applicant to discuss fully with the Examiner the claimed invention and the reasons supporting the nonobviousness thereof. Applicant would participate in person, with counsel participating by teleconference. If necessary, and at Examiner's convenience, please contact the undersigned to schedule such a meeting with the inventor, Dr. Philip Jacoby.

Claim Amendments

Claims 10-11, 13-16, 24-29, and 36 have been amended to recite that comparisons of properties between the claimed webs or sheets are made with respect to otherwise identical webs or sheets. No new matter has been added.

Claim Rejections under 35 U.S.C. § 103(a)

As an initial matter, Applicant notes that no objection or rejection under 35 U.S.C. § 112 or 35 U.S.C. § 102 has now been applied to the pending claims, thereby indicating that the claims are definite, enabled, and novel. Consequently, Applicant understands that the sole remaining issue concerns the nonobviousness of the pending claims.

The Office Action has rejected claims 10, 12-16, 25-29, 31, and 34 under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 4,374,798 to Mercer (hereinafter

"Mercer") in view of U.S. Patent No. 5,310,584 to Jacoby *et al.* (hereinafter "Jacoby I"). Claims 30 and 32 are also rejected as obvious over Mercer in view of Jacoby I and further in view of U.S. Patent No. 4,975,469 to Jacoby *et al.* (hereinafter "Jacoby II").

Applicant respectfully disagrees that the pending claims are obvious in view of the cited references. Specifically, one of ordinary skill in the art would not have been motivated to combine the teachings of Mercer with the teachings of Jacoby I and/or Jacoby II to arrive at the claimed oriented webs. Nonetheless, while Applicant does not agree that the Office Action has properly set forth a *prima facie* obviousness rejection of any of the pending claims, in order to expedite prosecution of the pending claims, Applicant has presented data that demonstrate the unexpectedly superior results of the claimed methods and compositions.

- **Showing unexpectedly superior results overcomes *prima facie* obviousness**

It is well-settled law that greater than expected results are evidence of nonobviousness. MPEP § 716.02(a)(I) (quoting *In re Corkill*, 711 F.2d 1496 (Fed. Cir. 1985) ("A greater than expected result is an evidentiary factor pertinent to the legal conclusion of obviousness ... of the claims at issue."). Rebuttal evidence includes evidence that the claimed invention yields unexpectedly improved properties. MPEP § 2145 (citing *In re Dillon,* 919 F.2d 688, 692-93, (Fed. Cir. 1990)). Thus, a showing that (1) the results were greater than those which would have been expected from the prior art to an unobvious extent and (2) that the results are of a significant, practical advantage is sufficient to rebut a *prima facie* obviousness rejection. MPEP § 716.02(a)(I).

- **Results associated with the claimed oriented webs are unquestionably of a significant, practical advantage**

Applicant has presented data in the as-filed specification as well as in the declaration of Dr. Philip Jacoby submitted in May 2007 that demonstrate the unexpectedly superior results of the claimed methods and compositions. That is, beta nucleation enables redistribution of polymer during orientation (stretching), which increases both the strength and rigidity of the final

geogrid (oriented web). Thus, the claimed invention can provide substantially stronger, more uniform, and more stable oriented webs at a lower web thickness and mass per area, compared with conventional techniques. More specifically, as disclosed in the specification:

> The perforated beta nucleated sheet also exhibits different stretching characteristics during the orientation steps than sheets without beta spherulites, such that more resinous polymer is drawn out of the node junction region between the machine direction (MD) and transverse direction (TD) oriented strands. Thus a greater percentage of the web area has solid polymer structure. This altered stretching behavior results in an oriented web that has higher strength and torsional rigidity characteristics. The high strength and modulus of the strands that form the mesh, their reduced density, and the greater percentage of solid polymer in the web allows for the production of lighter weight mesh structures which meet all of the physical property requirements for end-use applications, such as reinforcing grids to stabilize concrete and soil in civil engineering and landfill applications. The lighter weight extruded beta nucleated sheet can also be stretched at higher line speeds, and this higher productivity also reduces the cost of the final product. Thus, a mesh that contains the same strength and modulus as a polypropylene mesh without beta spherulites can be formed from less raw material and at a faster rate when beta spherulites are used.
>
> U.S. Application Publication No. 20050003151 (Serial No. 10/824,730) at [0014].

These results are unquestionably of a significant, practical advantage.

- **Results associated with the claimed oriented webs are greater than those which would have been expected from the prior art to an unobvious extent**

It is believed that Mercer represents the closest prior art. Nonobviousness of the pending claims can be shown by establishing that the results associated with the claimed oriented webs are greater than those which would have been expected from Mercer to an unobvious extent. The Office Action concedes that "[t]he samples [presented in the specification] clearly show an improvement over the Mercer reference." Office Action mailed January 24, 2008, at page 5. Thus, the question becomes whether such significant improvement would have been expected by one of skill in the art at the time the instant application was filed.

Again, the claimed invention can provide substantially stronger, more uniform, and more stable oriented webs at a lower web thickness and mass per area, compared with conventional techniques. These results would not have been expected by a polymer chemist at the time the application was filed. More specifically, one of skill, having knowledge of Mercer and Jacoby I, would not have understood that use of a beta nucleant when performing the Mercer process would result in redistribution of polymer during stretching, which would increases both the strength and rigidity of the final oriented web.

At best, one of skill may have understood from Jacoby I that use of a beta nucleant could lower the melting point of an extruded sheet in the Mercer process:

> For optimum formation of beta-spherulites in the melt-formed sheet the quench temperature of step (b) is about 90 °C to about 130 °C. The thermoforming temperature of step (c) should be sufficient to melt the beta-spherulites but not the alpha-spherulites. Typically, the beta-spherulite form of polypropylene has a melting point of about 144 °C to 148 °C and the alpha-spherulite form of propylene has a melting point of about 159 °C to 163 °C. By heating the quenched sheet to a temperature in the range of about 144 °C to 148 °C, the beta-spherulites soften and allow thermoforming of the sheet. The alpha-spherulites remain in the solid phase, provide integrity to the sheet and prevent excessive sagging of the sheet during thermoforming.
>
> U.S. Patent No. 5,310,584 (Jacoby I), column 11, lines 33-46.

One of skill, however, would not have expected that a decrease in melting temperature would relate in any way to redistribution of polymer during stretching. This lack of expectation comes at least from the fact that a geogrid formation process involves no melting of the extruded sheet. To the contrary, the mechanism of an orientation process is entirely different from a melting process. In fact, Jacoby I discloses that, when heated at a temperature less than the melting temperature, the extruded sheet could exhibit a tendency to undergo "microvoiding":

> In a particular embodiment of the method of this invention when the thermoforming temperature of step (c) is less than the melting temperature of the beta-spherulites of 144 °C to 148 °C, the thermoformed article of step (d) can exhibit a tendency to undergo "microvoiding". By microvoiding is meant the formation of very small voids within the sidewalls of the thermoformed articles. This microvoiding produces an opaque, white thermoformed article

> without the presence of a filler. The sidewalls of these containers have a density from about 2 to about 20% less than the sheet from which they were formed. Although the microvoiding provides a less dense sidewall the article still has integrity and vapor barrier properties.
>
> U.S. Patent No. 5,310,584 (Jacoby I), column 11, lines 47-60.

Therefore, alternatively, one of skill may have understood from the above passage in Jacoby I that use of a beta nucleant could lower the density of a thermoformed article produced from an extruded sheet. One of skill, however, would not have understood that "microvoiding," and its accompanying decrease in density, would relate in any way to redistribution of polymer during stretching. This lack of expectation comes at least from the fact that Jacoby I teaches "microvoiding provides a less dense sidewall." How could one of skill expect that a less dense thermoformed article produced from extruded sheet would provide a stronger and more rigid final oriented web? Mercer, Jacoby I, and the Office Action all fail to answer this question.

- **On balance, indicia of nonobviousness of the claimed oriented webs substantially outweigh any evidence of obviousness**

First, there is absolutely no express suggestion in either Mercer or Jacoby I to combine the teachings of beta-nucleation with geogrids formation. In fact, the Office Action merely proposes that "it would have been obvious . . . to use Jacoby '584's polypropylene material as the polypropylene material in Mercer in order to improve the strength of the sheet." Office Action mailed January 24, 2008, at page 3 (citing Jacoby I at column 3, lines 20-30). Close inspection of the cited passage of Jacoby I reveals that this reference does not teach that the use of beta-nucleation can improve the strength of the sheet:

> Advantageously, the thermoformable sheet of this invention comprises one or more layers of a crystalline resinous polymer of propylene having beta-spherulites present at a K-value of about 0.3 to 0.95 which can be thermoformed at significantly higher production rates and the sheet produces thermoformed articles which exhibit improved sidewall strength, reduced warp, and improved microwaveability compared to articles produced from conventional alpha-spherulite nucleated or non-nucleated polypropylene-based resins. Additional advantages are found in embodiments of the invention

> comprising multilayer sheets which include interior layers of beta-spherulite nucleated resinous polymer of propylene and exterior layers of polypropylene-based resins such as ethylene-propylene impact copolymer for improved low-temperature impact resistance.
>
> U.S. Patent No. 5,310,584 (Jacoby I), column 3, lines 15-30 (emphasis added).

Thus, Jacoby I actually teaches that the thermoformed articles, not the extruded sheet itself, exhibit improved sidewall strength.

Moreover, Jacoby I teaches that the thermoformed articles exhibit improved sidewall strength. Sidewall strength refers to "crush strength" (or "crush") of the thermoformed articles, as measured in Examples 11 and 12 and tabulated in Tables VIII and IX (see Jacoby I, top of columns 19 and 20, bottom of columns 21 and 22; reproduced below for the Examiner's convenience).

TABLE VIII

		Measured Properties - 16 Ounce Deli Bowl								
								Thickness Profile (in)		
Example	Measurement Value Spec	Weight (g)	Crush (lbs)	Diameter (in)	Height (in)	Warp (in)	Underrim	Side-Wall	Bottom	Corner
Control	Ave.	11.16	23.70	4.552	3.163	0.0187	0.0152	0.0097	0.0298	0.0047
14.9 cpm	SD	0.123	3.88	0.014	0.017	0.0257	0.0025	0.0010	0.0034	0.0009
Example 9	Ave.	11.31	34.88	4.565	3.142	0.0069	0.0163	0.0118	0.0296	0.0061
16 cpm	SD	0.124	4.00	0.006	0.004	0.0049	0.0016	0.0007	0.0018	0.0008
Example 9	Ave.	11.31	29.77	4.565	3.139	0.0095	0.0141	0.0122	0.0303	0.0062
17 cpm	SD	0.09	4.69	0.006	0.005	0.0044	0.0016	0.0008	0.0013	0.0008
Example 9	Ave.	11.36	34.14	4.563	3.134	0.0079	0.0156	0.0116	0.0299	0.0058
18 cpm	SD	0.14	3.04	0.006	0.004	0.0044	0.0019	0.0008	0.0018	0.0010

TABLE IX

		Measured Properties - 16 Ounce Deli Bowl								
								Thickness Profile (in)		
Example	Measurement Value Spec	Weight (g)	Crush (lbs)	Diameter (in)	Height (in)	Warp (in)	Underrim	Side-Wall	Bottom	Corner
Example 12	Ave.	11.40	26.5	4.54	3.145	NM	0.0123	0.0112	0.0267	0.0056
18.1-18.3 cpm	SD	0.11	3.7	0.03	0.011	NM	0.0014	0.0009	0.0019	0.0010
Example 12	Ave.	12.38	31.2	4.56	3.172	0.017	0.0159	0.0119	0.0235	0.0053
18.7 cpm	SD	0.20	4.5	0.02	0.017	0.016	0.016	0.0009	0.002	0.0012
Example 13	Ave.	11.54	30.9	4.56	3.138	NM	0.0150	0.0112	0.0292	0.006
15-18 cpm	SD	0.16	5.0	0.03	0.005	NM	0.0021	0.0009	0.003	0.0008
Example 13	Ave.	12.26	30.2	4.52	3.177	0.015	0.0178	0.0141	0.0266	0.005
18.7 cpm	SD	0.17	4.0	0.07	0.019	0.019	0.0026	0.0012	0.0022	0.0009

SD standard deviation
NM Not measured

The "crush strength" described in Jacoby I measures the resistance to sidewall deformation of a thermoformed article, which has no analogy in an orientation process. In contrast, the increase in strength exhibited by the claimed oriented webs refers to tensile strength, as measured for samples 6 and 3-5 and tabulated in Table IV (see U.S. Application Publication No. 20050003151 (Serial No. 10/824,730) at page 10; reproduced below for the Examiner's convenience).

TABLE 4

Physical Properties of Biaxially Oriented Black Grids

Sample	Q-dye (ppm)	Extruded Sheet Thickness (mm)	2% MD Tensile (kN/m)	2% TD Tensile (kN/m)	5% MD Tensile (kN/m)	5% TD Tensile (kN/m)	MD Ult. Tensile (kN/m)	TD Ult. Tensile (kN/m)	Mass (kg/m2)	Torsional (cm-(kg/deg)
6	0	4.5	6.0	9.0	11.8	19.6	19.2	28.8	0.313	6.5
3	12	4.5	7.9	13.0	13.2	23.3	24.3	36.4	0.309	8.7
4	12	4.15	7.6	11.5	12.6	21.4	23.9	32.2	0.268	9.1
5	12	3.84	7.6	11.6	12.8	21.3	23.4	31.0	0.254	8.0

Thus, the Office Action proposes a combination of Mercer and Jacoby I that is based upon two assumptions: (1) that an improvement in strength of a thermoformed article is equivalent to an improvement in strength of an extruded sheet and (2) that an improvement in sidewall ("crush") strength is equivalent to an improvement in tensile strength. Even further, the Action's proposal is made with no explicit rationale offered to explain why a thermoforming additive would be expected to also be effective in an orientation process.

Second, Applicant has demonstrated – *and the Office has agreed* – that the claimed oriented webs clearly show an improvement, of a significant and practical advantage, over the closest prior art reference. See Office Action mailed January 24, 2008, at page 5 ("The samples [presented in the specification] clearly show an improvement over the Mercer reference.").

Third, Applicant has established that one of skill in the art at the time the instant application was filed would have not expected that the combination of the teachings of Mercer and Jacoby I would provide oriented webs having redistributed polymer, thereby having increased strength and rigidity. Instead, at best, one of skill may have expected that the extruded

sheet used to make the claimed geogrids would have a decreased melting temperature and/or that the claimed geogrids would have a decreased density.

Balancing the alleged indicia of obviousness (a proposal – based upon two assumptions and without explicit rationale – that the asserted combination may result in a stronger sheet) with the indicia of nonobviousness (a clear improvement, of a significant and practical advantage, over the closest prior art that would not have been expected by one of skill in the art at the time the application was filed), it is believed that the pending claims are nonobvious in view of the cited references.

- **The instant unexpected superior results are more than an inherent advantage which would flow naturally from following the suggestion of prior art**

The Office Action has also asserted that "[t]he fact that applicant has recognized another advantage which would flow naturally from following the suggestion of prior art cannot be the basis for patentability when the differences would otherwise be obvious." Office Action mailed January 24, 2008, at page 5 (apparently citing MPEP § 2145(II) (quoting *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985)). Applicant agrees that, in light of a strong, express suggestion to combine teachings, inherent properties that result from mere "obvious differences" (i.e., expected) cannot form the basis for patentability.

Cases cited in MPEP § 2145(II) for this proposition (including *In re Wiseman*, 596 F.2d 1019 (CCPA 1979); *In re Baxter Travenol Labs*., 952 F.2d 388 (Fed. Cir. 1991); and *In re Lintner*, 458 F.2d 1013 (CCPA 1972)) explain that a strong suggestion to combine references may not be overcome by rebuttal evidence consisting of an inherent property. In each these cases, the inherent properties held unsatisfactory to rebut a *prima facie* obviousness rejection were also present in a single piece of prior art, which was used to make the rejection. Thus, the claimed invention did not exhibit results greater than those which would have been expected from the closest prior art (i.e., the invention was not in fact superior).

Other case law cited in MPEP § 2145(II) for this proposition (for example, *In re Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985)) explains that, in the face of an explicit suggestion to make the asserted combination (even for a motivation that is different from the applicant's motivation), discovery of an inherent result may not, on balance, suffice to overcome a *prima facie* obviousness rejection (i.e., the invention was not in fact unexpected).

In the instant case, however, no express suggestion to combine Mercer with Jacoby I has been found in the prior art. Further, no explicit rationale has been offered to support the Office Action's proposal (i.e., to explain why a thermoforming additive would be expected to "improve the strength of the sheet"). Even further, Applicant has established that the superior results associated with the claimed oriented webs would not have been expected by one of skill in the art at the time the application was filed. Thus, the instant unexpected superior results are more than an inherent advantage which would flow naturally from following the suggestion of prior art.

For at least the reasons discussed in detail above, Applicant respectfully requests withdrawal of the rejections under 35 U.S.C. § 103(a).

Request for Rejoinder of Method Claims

In view of the nonobviousness of product claims 10, 13-16, and 25-33, Applicant respectfully requests rejoinder of withdrawn method claims 11, 23-24, and 34-36:

> The propriety of a restriction requirement should be reconsidered when all the claims directed to the elected invention are in condition for allowance, and the nonelected invention(s) should be considered for rejoinder. Rejoinder involves withdrawal of a restriction requirement between an allowable elected invention and a nonelected invention and examination of the formerly nonelected invention on the merits.
>
> MPEP § 821.04.

Product claims 10, 13-16, and 25-33 are allowable; method claims 11, 23-24, and 34-36 include all the limitations of at least one of allowable product claims 10, 13-16, and 32-33 and/or

25-31. MPEP § 821.04(b) states that "if applicant elects a claim(s) directed to a product which is subsequently found allowable, withdrawn process claims which depend from or otherwise require all the limitations of an allowable product claim will be considered for rejoinder." MPEP § 821.04(b) also states that "[p]rocess claims which depend from or otherwise include all the limitations of the patentable product will be entered as a matter of right if the amendment is presented prior to final rejection or allowance."

In the event that the Examiner proceeds as requested – and method claims 11, 23-24, and 34-36 are rejoined and found allowable (for at least the reasons the product claims are allowable) – Applicants authorize the Examiner to cancel withdrawn concentrate claims 17-22 by Examiner's Amendment, provided such action will enable the issuance of a formal Notice of Allowance for claims 10-11, 13-16, and 24-36 and provided any cancellation is without prejudice to pursue the deleted subject matter in one or more divisional and/or continuation applications.

CONCLUSION

In light of the above amendments and arguments, the claims are believed to be allowable, and Applicant respectfully requests notification of same. The Examiner is invited and encouraged to directly contact the undersigned if such contact may enhance the efficient prosecution of the application to issuance.

A three-month shortened statutory period was set for response, nominally ending April 24, 2008. Therefore, this paper is timely. Payment in the amount of $405.00 (reflecting the $405.00 fee for the Request for Continued Examination for a small entity) is enclosed herewith. No further fee is believed due. However, the Commissioner is hereby authorized to charge any fees that may be required or credit any overpayment to Deposit Account No. 14-0629.

Respectfully submitted,
NEEDLE & ROSENBERG, P.C.

/D. Brian Shortell/

D. Brian Shortell, JD, PhD
Registration No. 56,020

NEEDLE & ROSENBERG, P.C.
Customer Number 23859
(678) 420-9300 Phone
(678) 420-9301 Fax

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I hereby certify that this correspondence – including any items indicated as attached, enclosed, or included – is being transmitted by EFS-WEB on the date indicated below.

/D. Brian Shortell/	April 24, 2008
D. Brian Shortell, JD, PhD	Date